HOPKINS COMMENCEMENT

(Continued from Ninth Page.)

long as possible in the morning.

When we are in the midst of our pleasures we make light of this and say that they are too old to know; but we shall find to our sorrow that they are right.

Rome, at one time the foremost nation of Europe, gradually ceased to be of importance because she began too fast an existence. For many centuries, as mistress of the world, she held her high position; then came the reaction, and Roman soldiers and Roman statesmen became Roman Sybarites. Next, foreign mercenaries were hired to do the work which the Roman soldiers had done so nobly, and soon the nation fell into decay.

In our own country we have lost many brilliant men almost in the prime of life. Ought not Webster and Calhoun to have lived to the age of Gladstone and Bismarck? How many times since the death of these men has this nation needed their opinion, their advice, on matters of state? To be sure other men seem to step in and fill their places and the world moves on just the same; but in grave public crises the advice of such men is invaluable.

England will find some one to fill Gladstone's place; Germany can carry on her affairs without Bismarck and her army without Von Moltke; but in time of war there are no men in these countries upon whom the people could or would rely as upon these veterans. Rome, after she had banished one of her commanders, Cincinnatus, was invaded by the enemy and was obliged to send for this old man who was almost forgotten and to place him in command of her troops. He is said to have left the plow in its furrow and to have hastened to Rome, where he won new triumphs for his native land; and this he accomplished when he had passed the limit of the years allotted to man.

If we were to fight again—as we hope we never shall—where is the man to take the place of Ulysses S. Grant? Where is the man who like him has both the talents of the soldier and the leader—the power to persevere and to plan—to direct and to fight?

When we calmly think of it, we wonder when this hurry is to stop. Is the fate of Greece and Rome to be our fate? Is our glorious country, exhaustless in resources, the envy of nations and the pride of its people, to give way to some other nation and become a thing of history? We all answer "No!" But there are many truths staring us in the face and we must meet them fearlessly and with judgment. Let some of our great thinkers, instead of estimating the number of people this country can support, or the greatness of the possibilities of South America, or the resources of Africa, devise for us a code of living, a simple, ideal life which shall make us look forward with pleasure to old age, not as a time of weakness but of srength, a time when we may enjoy to the full, with a "sound mind in a sound body." T. WILLIE ROCKINGHAM.

MISS FLORENCE JESSIE BRIGHT'S ESSAY ON BENEDICT ARNOLD.

Miss Florence Jessie Bright then read her essay, "Benedict Arnold," which was of great interest. She told of Arnold's desperate encounter with the British on Lake Champlain and his gallant conduct in rescuing his men under most adverse circumstances. She then told of his public reprimand by General Washington in the Morristown court house. She then continued as follows:

It is midnight! Wrapped in the thick darkness lies West Point. Slowly and silently the great Hudson flows by, breaking only with a low ripple the dead stillness of the night. The dark mountains cast their weird shadows over the silent river. A cold, chilly air rises from the valley. Only the black clouds above and the dark earth beneath. An awful lifeless gloom.

But see! the figure of a man! It moves! It is lost in the shadow of the mountain. Another! The moon slowly rises; its light falls on the face of one! Benedict Arnold! But listen! He is speaking! "It is treason, Andre! I hate myself for it! I am betraying the land I have bled for."

"What does your country care for your services," comes the quick retort. "You may lead the army to battle while Gates, sitting coolly in his tent, gets the medal. You get a reprimand. The hot color mounts to Arnold's forehead. Fierce passion blazes in his eyes. "I hate them," he cries. "I would give the last drop of blood in my veins to injure them. They have driven me to it and made me the villain I am."

The cold moon shines down, bringing out every line of his face with awful distinctness. And such a face! At times it is fairly livid with rage! Every fibre and muscle trembles with passion.

"England knows how to appreciate bravery." Andre continues alluringly. "She never forgets her heroes! Think what she did for Marlborough, and he was a double traitor. I tell you, Arnold, she will give you wealth and honor and a title instead of a reprimand and disgrace."

"But Washington, oh Andre! It is the treachery to him that I cannot endure. He has been a brother to me. I would almost rather die than deceive him." There is an intensity in his voice amounting almost to agony.

"But you are serving your country. You know she cannot gain her independence, and if she does it will simply be to become a vassal of France. England stands ready to give her everything except independence! It is your duty and privilege to reconcile mother and daughter. It is a grand opportunity. You will be a hero, a second Clive! Deliver up West Point, end the war, and your country will bless you."

"But, Andre, my wife and children! They will hate me if I leave to them a name black with dishonor."

"Nay, Arnold, the wives and mothers of the poor, starved soldiers of the continental army will rise up and bless you as a peace-maker. The end justifies the means. Trample your scruples under foot, and history will write your vindication. There is a dead silence. Only the distant ripple of the water and the faint sighing of the wind can be heard. It is an awful moment for Benedict Arnold. Convulsed with ungovernable passion, maddened by insult, eager for fame, thirsting for revenge, he struggles within himself. His better feelings rise within him. But stronger rises the memory of that public disgrace. His face hardens, ugly lines settle about his mouth, and in a low, husky voice he says, 'Bring up your troops, and West Point is yours.'"

Morning approaches; the first gray streaks of dawn tinting the sky so that the conference is no longer safe. They leave the lonely spot and hasten towards the river. They pause upon the bank and look out upon the mighty river. Thoughts of his past life and work come crowding back upon Arnold. Thoughts of Champlain and bloody Saratoga.

"My name will be associated forever with the Hudson and the ——," he murmers. "O my God," as the terrible thought strikes him, "will it be with infamy!"

They have parted, Andre having gone on his perilous journey while Arnold sits breakfasting with his guests. A horse dashes up, its rider bearing a letter. Andre had been captured.

Calmly Arnold receives the news, excuses himself from his guests, and reveals the awful truth to his wife.

He springs upon his horse, gallops down the steep and reaches the British ship.

Wife, country, glory, fame, he has left behind him, and only black dishonor faces him.

It is June, and the world is full of sweetness, but into one sad home none of the bright sunshine and gladness penetrates. Dark and silent it stands on a little back street in the lower part of London. The tightly closed blinds and the awful stillness betoken that death's angel is near. In this mean little dwelling Benedict Arnold lies dying. Few would recognize in that emaciated form stretched on a rough bed the hero of Saratoga, once the idol of America. His eyes are dull and sunken; there is a wild, haunted look in his face and the bitter lines about his mouth bespeak a life of sorrow and unrest. Only his wife is beside him. No friend comes to soothe his last hour.

Utterly deserted, utterly forgotten, he is dying in a foreign land! A terrible delirium is upon him. He tosses from side to side, but finds rest for neither soul nor body. He raves, he shrieks; he tears himself in his madness. Then for a moment he is still. His consciousness is returning. His eye brightens. He raises himself in his bed, and there is a deep eagerness in his face. "Bring me the epaulettes and sword knots which Washington gave me," he says. "Let me die in my old American uniform; the uniform I fought my battles in."

Gently and tenderly he is clothed in his old soldier suit. With a sigh of deep satisfaction he sinks back upon the pillow, and with his last dying breath murmurs, "God forgive me for ever putting on any other."

A musical selection, "Morning is Nigh" (Danube Waltz Song), was then very excellently rendered by the class.

Mr. William Bloomfield Starkweather then delivered an oration entitled "The Stuarts." It was as follows:

"THE STUARTS," BY W. B. STARKWEATHER.

It is the fate of most of us, to die in wholesome obscurity. Of all the millions who have lived upon the earth but a small number have left any trace in history. For a few centuries our ancestors, the commonplace ancestors of a commonplace people, are remembered by their descendants, but then their memory gradually fades away, as our portraits of them darken with age, until finally they are as effectually erased from the mind as are their features from the canvas.

There are some, however, whose names will live, the details of the lives familiar facts to every schoolboy, their career an influence upon all that follow. Either by the unprecedented amount of some great quality which they possessed, by the beauty of their goodness, or the audacity of their wickedness they startled the world into an eternal remembrance of them. Others owe their position in history merely to the accident of birth. Undistinguished personally, but born to sit upon a throne, many a long and dreary line of royal mediocrities has thus been forced into history.

There is one royal race, however, in which all were distinguished, in which all were personally interesting, fascinating the student even to-day across the dry pages of history, with that fatal and bewitching power which belonged to them as a family.

This race is the Stuarts. Of all families in history this has the most tragic interest. With them misfortune was hereditary for centuries, from their use in turbulent Scotland, down to the bitter end when the last of the Stuarts died penniless, rejected and despised in a foreign country. In "that fierce light which beats about a throne," there are few actions of any monarch which can go unrecorded. Flattered and adulated as they may have been in life, there will surely come a time of reckoning when their true motives and character will be revealed. History to-day is beginning to see under the dazzling figure of Napoleon, the general, the emperor, the man of destiny, the outline of the selfish Corsican adventurer. History can see in the Stuarts the bigotry, the selfishness, the superstition, which characterized the race; but it can also see that series of misfortunes which made them unfortunate beyond example, which stamped them like a seal, with that melancholy, that fatality of air peculiar to their house.

Not only were they themselves ruined, but it was perhaps their greatest misfortune to carry down to ruin all that came near them. Whole families and whole clans, who, although they might not and could not approve of the Stuart policy, could not help loving them, lost their lives and fortunes in their defense. Their fascination, their elegance and grace, their beauty ruined thousands even when they saw the weakness, the perfidy behind it all.

Of the family origin and the earlier Stuarts, we need say but little. Living in a ruder time, and ruling Scotland alone, the records of their lives are much more scanty than those of their descendants, whose splendid lot it was to inherit England. Scanty as they are, however, they yet show those fatal family traits which the later Stuarts exhibited in a larger and more dramatic degree.

The first in this group was that beautiful, that unhappy woman, Mary Queen of Scots. Possessed of all those distinguished arts and graces to which the Stuarts owe their fascination, she also possessed those characteristics which seemed so unavoidable in the make-up of every one of them, which drove them like an avenging justice to work out their own terrible destiny. Queen of Scotland, by her marriage queen of France, heir to the throne of England, no princess ever had brighter prospects than had she. By the death of her husband she lost France, by her own misfortune and folly Scotland and England. Awful, mysterious, this remarkable woman went on her fearful way through history. A player with life, a gambler with fate, by a series of unprecedented misfortunes, by the almost unconceivable recklessness of her folly, she went from the white throne and lilies of France, down to the black scaffold of Fotheringay.

The turbulent and romantic career of Mary was typical of the lives of her descendants. Witty, graceful, handsome, brave, they yet proved but poor kings, their lives and reigns being alike unhappy. Once they lost their kingdom through the impolite measures of the fated Charles. England regained by his elder son, it was destined that his younger son should be the last of the Stuart kings to wear it's crown.

In James we find mingled the most unhappy traits of the race. With that self-satisfied assurance, that persistency which so often characterizes weak men in high places, he blundered blindly on in a policy ruinous to himself and to his people. A morbid and self-conceited man, he was unable to distinguish between belief and bigotry, religious duty and religious fanaticism. He tried to force upon his nation an unwelcome religion and failed. The day at last came when even he could see that he was no longer a king. His courtiers and councellors had fled, his army and navy had declared for the enemy, his son-in-law was invading the kingdom, his daughters had left him. "My God," he cried in the first agony of desolation, "enough that my soldiers have forgotten their prince, my people, their king, but oh, beyond all this, my children forget their father." Pitiful indeed is the figure of the last of the Stuart kings fleeing in a common fishing boat, from the land which had once been his.

And now we come to a group of three united by the similarity of their unmerited distresses and known to history under the significant obloquy of the title "Pretenders." Driven from the throne of their fathers, exiles in a foreign country, the vivacity of their youth was wasted in the futile attempts to recover their sovereignty; their old age in the bitterness of despair.

The first of the Pretenders, the Chevalier de St. George, too greatly resembled his moody father to be an inspiring leader to the Jacobite party. He was naturally of an unhappy disposition, and under the influence of that series of disappointments which attended him from the cradle to the grave soon lapsed unto a state of torpid melancholy.

His two sons, Charles and Henry, were the last of the Stuarts. What terrible law of retribution is that, illustrated again and again in history, by which the last and worthiest of a royal line are visited with the sins of all their ancestors? These princes possessed but few of the worst traits and many of the best. The patience, the fortitude, the inspiring courage of Charles, the piety and benevolence of Henry, have gone far toward removing the stains from the Stuart name. And yet their lives were miserable shipwrecks, a distressing record of personal affliction, of faithless friends, of trust misplaced, of affection wasted, of crushing sorrow and disappointment; tossed, beaten, buffeted by the world, embittered with the knowledge of experience, their lives were a chaos of confusion and woe, from which one found relief in the church, the other only in the oblivion of death.

Through Charles for a time the hope of the Stuarts was revived. At the age of twenty-five, tired of waiting for help from evasive European monarchs, regardless of the failure of father and grandfather, he started out to conquer his birthright. At the outset he was unfortunate enough to lose his equipment, but against all advice, pushed on in his desperate course, landing in Scotland with seven men in the mad attempt to conquer three kingdoms. Almost as if by magic, his enthusiasm and bravery won him an army. The Scots rushed to arms for their "bonnie Prince Charlie." Popular, adored, he dressed himself in a plaid and marching along by the side of his Scotch soldiers, tried to lose his foreign air and to learn the rough Gaelic tongue and customs. His march through Scotland was a triumphal procession. At Holywood, the cradle and palace of his ancestors, was held a great ball. Here danced to the old Scotch tunes the prince and people, who were so soon to go down to ruin together.

The little Scotch army with its antiquated weapons won two battles against the English and marched far on into England. At last, taxed beyond endurance, it turned to retreat. At Culloden it met a British army vastly superior. Time and time again the ragged Scots charged upon the regulars with the vehemence of despair, but fell to the ground before the enemy's line in rows three and four deep, their deaths an eternal mark of Scottish love and loyalty.

Soon all was over. The Stuart cause was lost forever. Culloden was the last chapter. By a series of miracles Charles escaped from the land it had been his dream to conquer. Let us leave him here. What need to speak of the follies in which a broken man plunged to drown his grief?

To-day in the Church of St. Peter's at Rome, the symbol and centre of that religion for which they suffered so much, may be seen the tomb of the last of the Stuarts. Even in death they are pursued by that mockery which was their lot in life. As if by irony of fate, we find engraved upon the marble of Canova, their titles as kings of England, titles for which they fought, but which they never really possessed, mere empty names—James III., Charles III., Henry IX. One can think no longer of the virtues and vices of the race, no longer of the value of their defeat, but only of the wreck and ruin of their noble lives.

WILLIAM BLOOMFIELD STARKWEATHER.

MISS GRACE A. JOHNSON'S PAPER ON HARPER'S FERRY AND THE MAN WHO MADE IT FAMOUS.

Miss Grace Adele Johnson then read the essay on "Harper's Ferry and the Man Who Made It Famous." The paper was in part as follows:

Frederick Douglass said: "It was not Carolina, but Virginia, not Fort Sumter, but Harper's Ferry—not Major Anderson, but John Brown who began the war that ended American slavery and made this a free republic. Until this blow was struck, the prospect for freedom was dim, shadowy, and uncertain. The irrepressible conflict was one of words, votes and compromises. When John Brown stretched forth his arm the sky was cleared—the time for compromise was gone—the armed hosts stood face to face over the chasm of a broken union and the clash of arms was at hand!"

Until the troubles in Kansas the world knew nothing of John Brown.

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Th story of Brown's capture, of the slaughter of his men, of his own fearless bearing and heroic sayings during his captivity, and of his final martyrdom, "making the gallows glorious like the cross," all this is too familiar to be told here. It has become a part of the world's history and literature, a new chapter added to the record of heroism and self-devotion.

The deed of his life sprang from a spirit as guileless, as pure, as true, and as unselfish as that of a child; but it was performed by a man whose every fibre had been steeled by the stern discipline of life; a man whose will could neither be broken nor bent; a man never excited to revenge even by the worst injustice exercised toward himself, but who was goaded on to such a rage by the wrong which he daily saw being done by his fellow creatures that he recklessly transgressed all human law and recognized as binding only what he considered to be God's command. And as we hear the old familiar song:

"John Brown's body lies mould'ring in his grave
But his soul goes marching on."

The words take upon themselves a new meaning; and we feel that the cause to which he devoted mind and soul—the cause of his fellow men, the righting of wrong, the battering and ennobling of the human race—all this is "marching on" nearer and nearer to the heights which John Brown tried to gain.

The class then rendered a humorous musical selection entitled "The House That Jack Built."

Charles Frederick Parker then gave the scientific exercise entitled "How Electric Energy is Converted Into Light in System of Electric Lighting." It was illustrated amply by experiment, and was as follows:

"HOW ELECTRIC ENERGY IS CONVERTED INTO LIGHT IN SYSTEMS OF ELECTRIC LIGHTING."

(By Charles Frederick Parker.)

In contemplating the phenomena of the physical universe the thoughtful mind is not content to look merely at the things which are seen but seek to look behind the outward manifestation of nature to the inward principles, force and causes which are unseen. "The inquiring mind," as Professor Tyndall has said, 'endeavors by means of the tangible processes of nature to apprehend the intangible. To this inquiring spirit—the desire to penetrate into the hidden secrets and significance of the world around us—are mainly due wonderful discoveries and conquests over nature, wrought by men of science, the practical application of which so largely distinguishes the civilization of our day from that of primitive man.

Ours has often been called an age of science, and justly so, for never before was the spirit of scientific investigation so widely diffused.

On all sides there is manifest a growing interest in the phenomena of the universe—a desire not merely to learn what those phenomena are, but also what are the underlying forces and principles upon which these manifestations depend.

And yet, widespread as is this thirst for knowledge, the real character of many of the commonest occurrences of nature is not generally understood.

Nothing, for example, is more familiar to all than heat, and yet the majority of men, perhaps, have no very distinct idea of what heat really is. The same may be said with equal truth of light, electricity, magnetism and many other natural phenomena of common every-day occurrence.

With the hope of making plain the real nature of one or two of these common things present in our experience and observation almost every instant of our lives, I will ask your consideration for a few moments to the study of the electric light, and with the aid of a few experiments will endeavor to make clear what light really is and how it is obtained from electricity in the various systems of electric lighting.

From time immemorial the question has been asked 'What is light?'

The most ancient view supposed light to be due to some sort of feeler projected out of people's eyes by which they felt objects. This absurd notion long prevailed, but was finally abandoned when some one thought to ask "What then is the cause of night and day, and why cannot we see in the dark?"

It at once became evident that light originates, not in the eye, but in the sun, or lamp or other luminous body.

A more recent view was that light was due to small particles emitted by bright bodies. These minute particles, innumerable in number, were supposed to be shot off in straight lines from the sun, every star, lamp and other source of light, to enter the eye and there produce the sensation of light. This theory was known as the corpuscular or emission theory. While it accounted satisfactorily and clearly for many of the phenomena of light, it failed utterly to solve many others and had finally to be abandoned.

The emission theory of light was succeeded by a view which completely explains all the facts, reconciles all preexisting discrepancies, and which is now accepted as established by all scientists. This theory is known as the ether theory or undulating theory of light.

According to this view light consists of waves in a fluid which is supposed to fill all space.

This fluid has been named the layaiferous ether or ether of space. The ether is supposed to be a very thin fluid, so thin that the planet can more freely pass through it without resistance, to be without weight, to possess perfect elasticity and as we have just said, to fill all space to the remotest bounds. Most of us have been accustomed to think of space where no matter is as being empty. But according to the ether theory, there is no such thing as empty space, for just as we call an unfinished room empty, although we know it to be filled with air, so the depths of space once believed to be empty are now known to be filled with luminiferous ether. Light consists merely of waves in the ether which pass rapidly through it very much as water waves travel over the surface of a body of water.

Let us fully grasp this grand conception, for there is no grander throughout the entire national universe all around us; everywhere space is traversed in all directions by myriads of waves.

The profoundest mathematical researches applied to the most refined experiments have so far only confirmed that theory in every particular.

Having learned what light is, we must now inquire how light is produced. All matter is composed of very small particles called molecules. Between these molecules are spaces called pores. When you heat any body its molecules are thrown into vibration.

They move to and fro, come into collision, bound and rebound. The faster these molecules move the hotter the body becomes. Heat then is nothing but the motion of the molecules of a body.

Now when any body is sufficiently heated it gives out light. That is its molecules when moving with great rapidity strike with such force against the surrounding ether that light waves are produced. When the molecules of a body vibrate with such rapidity that light is produced the body is said to be incandescent. All the artificial sources of light ever devised by man depend upon the development of light during incandescence.

Whether the light be obtained from candles, gas, oil or electricity, or whatever the source, in every case some body must be heated to incandescence.

In order that a light may be bright in nearly all cases it is necessary to heat some solid to incandescence for a burning gas itself possesses only a feeble illuminating power.

This fact may be easily demonstrated by experiment.

I have a large flame of burning coal gas the same as we use for illuminating our dwellings. It gives considerable light.

This light is due to the incandescence of particles of solid carbon which is one of the constituents of coal gas. I hold this clean white plate in the flame. You see it is covered with black soot.

This is the solid carbon. The brightness of the light is due to the incandescence of the solid particles.

When the coal gas burns its constituents combine with the oxygen of the air and pass off as gaseous products. If there is not a sufficient supply of air to consume all the ingredients of the gas at once the carbon particles float for a time unconsumed and their incandescence produces the light.

To show that this is the case I will pump into the flame a large supply of air.

The carbon is immediately consumed. The brightness of the light disappears. We will give another experimental proof of the same fact.

Here is an almost invisible flame made by burning oxygen and hydrogen.

To prove that the flame is intensely hot I place in it this iron wire. It is immediately consumed. I will now insert a stick of lime. The lime does not burn, but is soon heated to incandescence and a very intense light is given out. I will now ask you to consider the method by which light is obtained from electricity in our systems of electric lighting. We will take it for granted that all are aware that there is such an agent as electricity; that it can be obtained from a battery, dynamo or in other ways; that it will flow through a wire or other conductor from its source clear around the circuit back to its starting point, and finally that the direction of the flow of the current in the wire may be reversed at will.

One important fact, however, of which we must make use I will now demonstrate. If a wire through which an electric current is flowing is held over a compass or magnetic needle the needle is deflected or turned to one side.

I have here a large magnetic needle fixed for convenience in a vertical position. Now if I join the ends of these wires which lead to the dynamo in the electric power house on George street a current will flow through the entire circuit. A portion of the wire is passed around the magnetic needle, the index of which now stands at zero.

We will now close the circuit, the current flows and we see the needle is deflected. The deflection of a magnetic needle thus indicates that an electric current is passing. If the deflection is large the current is evidently strong, if small it is weak.

With these preliminary observations we may now consider how electric energy is converted into light. Experiments show that if the electric current be passed through a long wire, or a fine wire or some substance which is naturally a poor conductor, the current is weakened. Through this large copper wire I pass the current we see the deflection is ten degrees. Since the wire which conveys the electric current is large it offers no great resistance and so the current is strong. Upon this frame are wound several turns of rather fine wire. I place this wire in the circuit; the deflection is only five degrees. This shows that a fine wire resists the current and weakens it. "But why," you ask, "is the current weakened in passing through the long small wire? What becomes of the electric energy?" If you place your hand near these coils of wire your question will be answered. We find that the wire has become hot. We thus learn that when a electric current is resisted by a conductor the current weakens, but the heat in the conductor increases. Electric energy is thus through resistance converted into heat. If now, as we have already shown, we continue to heat the wire hotter and hotter until its molecules move so rapidly as to throw the surrounding ether into vibration we shall have light.

To accomplish this result we have only to place in the circuit a wire whose resistance is sufficiently great.

Thus upon this frame I have many feet of fine wire. The resistance is large both because iron is a rather poor conductor and because the wire is long and small.

We close the circuit. The resistance of the wire converts the electric energy into heat. This is plainly perceptible to one standing near. Now the wire becomes red-hot. It is heated to incandescence. The electric energy has been converted into light.

A few words will now suffice to explain the two systems of electric lighting by which our dwellings and streets are illuminated. In both systems the fundamental principle by which the light is obtained is that which we have already made manifest, namely that an electrical current when it meets with resistance is converted into heat, which if sufficiently intense produce light. The system used in lighting our dwellings is called the incandescent system. Upon the screen there is the projection of an incandescent lamp. The current is brought to it by large copper wires which are good conductors. Within the lamp and forming a part of the circuit is a small film of carbon, made in the Edison lamp from a thread of bamboo bent into a loop and carbonized by heating in an oven until all the gases of the wood are expelled. This carbon filament is a poor conductor, and if now we pass the current through it we see, as already explained, the resistance changes the current into such intense heat as to produce light. In the Arc lamp system used in illuminating our streets the lamp consists essentially of two sticks or rods of carbon placed end to end with their fronts slightly separated, through which passes a powerful electrical current. The current in order to pass through the circuit must pass through the air intervening between the posts. This air offers a great resistance to the current, which causes the extremities of the carbon to become intensely heated and give out a powerful light. Thus we see that in both the incandescent and Arc systems of electric lighting the light is produced by heating to incandescence particles of carbon—solid matter.

This completes the lesson which at the outset we sought to present.

Before concluding, however, we desire just to mention a proposed new system of electric lighting in which not a solid, but a gas is heated to incandescence. It has long been known that when an electric current passes through a rarified gas the gas becomes luminous.

I have here a tube known as a quisler tube which contains a rarified gas. Just penetrating the glass at each end, but extending only a slight distance within is a small piece of platinum wire. Connecting these wires to an electric generator a current passes though the arified gas and, as you see, it becomes brilliantly luminous. Rarified gases then as well as solids can be rendered incandescent by an electric current.

Recent experiments, the credit for which are mainly due to that rising electrical genius, Nicola Tesla, have shown that when alternating currents of high frequency and high potential are employed in connection with vacuum tubes, such as these, which contain only rarified air or some other gas, very surprising results may be obtained.

By the use of such currents Tesla has found it possible to render the interior of vacuum tubes brilliantly incandescent even when no wires are attached to the tube.

Thus holding in one hand an ordinary incandescent lamp from which the air has been exhausted, if the other hand be brought in contact with a wire containing these alternating currents the lamp will be brilliantly lighted.

As a practical application of the discovery Mr. Tesla has proposed a new system of electrical lighting in which it will be possible to light a house with vacuum lamps, to which no wires are attached but which may be carried freely about. Whether or not this system will prove of practical value remains to be seen. No one can predict the possibilities of the future, or foresee what achievement, once deemed impossible, shall be realized.

Much has already been wrought by the patient student, but Dame Nature has many doors still unlocked and who shall doubt but that to the earnest investigator who knocks and knocks and will not go empty away, these also shall be opened.

The class then sang "The Damascus Triumphal March" (from Oratorio of "Naaman"), with solo by Miss Emilie Neebe was rendered. Miss Neebe's singing was especially fine and won much praise for her from the audience.

Mr. John Lee Gilson then delivered the farewell address, which was as is given below. His efforts were much appreciated by the audience and by the members of the class, whose valedictorian he was.

THE FAREWELL ADDRESS BY JOHN L. GILSON.

Gentlemen of the Board of Education and Honored Superintendent:

From the time when the little band of Plymouth colonists built first the church, then the school-house, the people of these United States, and of New England especially, have worked for the same principle, knowing well that the better and broader the education of the youth the better and broader will be the citizenship.

This has nowhere been more keenly felt and more indefatigably labored for than in New Haven. Our city had no sooner established the grammar schools than she crowned all with the High school; and when in later times the world began to realize that moral and intellectual training must come early in life, New Haven was one of the first to see this and to make the public Kindergarten a part of her school system. Then, being ever alive to the best interests of her people, she added a Manual Training school. And to-day we see our public school system in the van of all that is best and most progressive.

We who to-night complete the entire course, who have enjoyed to the full these exceptional blessings, find it impossible to express our gratitude to you, gentlemen of the Board of Education, and our esteemed superintendent, who have so zealously and ably carried out the wishes of the people of New Haven, giving freely of your time and of your talents; but we hope that in the future we shall, as loyal and patriotic citizens, as men and women whose lives have been ennobled and enriched by these advantages, repay in some degree the debt which we owe to our city.

Our Principal:

Four years ago we entered Hillhouse together, you as guide and instructor, we as pupils. During these four years our school has steadily advanced to the front rank among High schools and all through your broad, vigorous and progressive administration.

As we leave you to-night we wish to assure you of the loyal affection which fills every heart, and to say that we shall earnestly strive to remember those principles of justice, truth and right, which are most essential to success in life, and which you have daily taught us by precept and by example.

Our Beloved Teachers:

Inexperienced as we are, we yet know that, "as is the teacher, so is the school," and that the reputation of our High school is due in no small degree to your faithful and noble efforts. Visions of wasted hours and many misdeeds rise before us, due rather to the high spirits of youth than to any willful wrong doing; but that is all past and forgiven, we know, we remember as we hope you do, only the pleasant hours we have spent together; and we most heartily thank you for your care, help and instruction, regarding you no longer as teachers to be obeyed, but as friends to be respected and esteemed.

Schoolmates:

It is with us much as it is with those who are leaving the world: we see more clearly than ever before the pitfalls, the follies of the past, the vanity of the things which we once thought so vital, the value of "those" things which are pure, lovely, and of good report. And out of our experience we would give to you a few words of loving advise. We would bid you uphold the honor of old Hillhouse not alone by high records in scholarship and athletics, but in those ways which cannot always be marked by an A or a B. We would bid you remember that, while "all work and no play makes a dull boy," no work and all play makes the dullest of boys; and that while athletics is an essential part of one's training, it ought to have its due proportion of attention and no more! We would remind you too, that a high school education ought to enable a boy or girl to do honest, earnest, and noble work in whatever place he is called upon to fill.

Finally, as we say good-bye to you, we wish you all the pleasure, which we have had in our years at Hillhouse, and all the success which earnest endeavor will surely bring.

Dear Classmates:

It is fitting time to ask ourselves the question—and on its answer depends all our future—what has our course at Hillhouse done for us? Has it prepared us to face any work boldly and bravely? Has it trained us to stand up valiantly for the right? to frown upon the wrong, the mean, the cowardly? Has it helped us to nobler and higher ways of living? to resist temptation? Has it taught us that labor is honorable? If it has done all this, then indeed we may lok back upon four well spent years and hopefully forward to a future, which while it may not be crowned with what the world calls success, will bring with it joy, peace and blessings. Free from those cares which of necessity must burden our future, we have spent many happy hours together; so fond has been our affection that not one discordant note has marred our harmony. And this makes our parting double sad and the farewell word doubly harder to say. But all good things must have an end and to-night sees the last of our many joyous Hillhouse days. For the last time assembled together we look upon faces and forms which association has made so familiar and so dear; and we linger, reluctant to say the parting word, bearing as always sorrow and pain. Yet the time has come, the word is inevitable. Farewell! and "may God's blessing be upon us, everyone."

The diplomas were then presented by Superintendent Curtis, with appropriate remarks, and the exercises closed with the singing of the class song, "On Golden Wings" by a quartet composed of Carrie L. Holmes, Clara B. Adams, Frank C. Eberth, Charles F. Williams.

Mr. Harry B. Jepson, class of '89 H. H. S., acted as pianist by invitation of the graduating class.

The music, which was under the direction of Professor Jepson, was especially excellent.

A Jury of Physicians Saves a Dog's Life

[From the Chicago Daily Tribune.]

In Washington boulevard, near Lincoln street, there lives a valuable Great Dane dog, the admiration of the neighborhood and the joy of his master, a man named Stein. It has been an eventful hot spell for the handsome big animal, more eventful than he himself is aware of. Friday he was under sentence of death. Then came a reprieve. A trial by jury resulted in a suspension of execution.

The ordinary course of things was reversed in this case. Usually the cry of mad dog is raised, the dog is killed on the spot, and then it is too late for a scientific inquiry into the matter. To make the case more remarkable, the dog had attacked and frightfully bitten a small boy. The boy's parents had demanded the life of the dog, and its owner had reluctantly consented to the sacrifice.

Friday afternoon, George, the nine-year-old son of Dr. Palmer, 691 Washington boulevard, was playing in the alley in the rear of his father's house. Near by, in Mr. Stein's yard, was the dog. According to the boy's story, he was running past the gate when the dog sprang upon him and knocked him down. No reason for the attack is assigned. The dog has not been able to make its side of the story clear. Mr. Stein thinks there are two sides to it. Anyhow the boy was badly injured before he was rescued. A big piece was taken out of one of his legs.

After Dr. S. J. Boyd had cauterized the wounds he asked about the dog. It is a common belief that a dog which bites anybody in warm weather is surely mad, and as surely should be killed to avoid hydrophobia in the person bitten. The dog had been condemned to die that night. It happens Dr. Boyd is a great lover of dogs. He determined to save this dog's life. The owner of the dog was only too willing to be convinced. Not so the father of the boy. Finally the boy's relatives agreed to Dr. Boyd's suggestion to send for Dr. Lagorio of the Chicago Pasteur Institute.

Dr. Lagorio is a sworn enemy to the practice of killing a dog simply because it has bitten somebody. Often the dog is not to blame, and more frequently killing it interferes with the diagnosis of alleged cases of hydrophobia following dog bites.

Yesterday morning a jury, consisting of Dr. Lagorio, Dr. Boyd and Dr. Palmer, met in Mr. Stein's back yard and gravely considered the appeal for clemency entered on behalf of the Great Dane. It was a case of mental aberration, if proved, resulting in conviction instead of a verdict of "Not guilty." The dog appeared in his own behalf and satisfied the jury that he was entirely sane when he committed the felonious attack.

The verdict was unanimous in its favor.